

Original Article

Effects of Low-frequency Current Sacral Dermatome Stimulation on Idiopathic Slow Transit Constipation

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Abstract. [Purpose] This study aimed to determine whether low-frequency current therapy can be used to reduce the symptoms of idiopathic slow transit constipation (ISTC). [Subjects] Fifteen patients (ten male and five female) with idiopathic slow transit constipation were enrolled in the present study. [Results] Bowel movements per day, bowel movements per week, and constipation assessment scale scores significantly improved after low-frequency current stimulation of S2-S3. [Conclusion] Our results show that stimulation with low-frequency current of the sacral dermatomes may offer therapeutic benefits for a subject of patients with ISTC.

Key words: Low frequency, Constipation, Transcutaneous electrical nerve stimulation

(This article was submitted Nov. 11, 2013, and was accepted Jan. 7, 2014)

INTRODUCTION

Idiopathic functional constipation is a clinical ailment that is difficult to manage. In general, constipation contributes to decreased quality of life¹⁾ and colon cancer²⁾. Specific solutions for reducing idiopathic slow transit constipation (ISTC) include pharmacological therapy³⁾, biofeedback⁴⁾, and surgical treatment⁵⁾. Although the effects of these treatments have been confirmed in previous studies, it may be difficult for most people to adhere to a regular pattern of medicine treatment and biofeedback exercise. Surgery is also an unattractive option for most patients, and abdominal pain and bloating may continue⁶⁾. In some cases, the intervention of sacral nerve stimulation has been reported to be a successful way of treating urological function problems^{7, 8)}. To our knowledge, few studies have been conducted on the use of low-frequency current in managing constipation, and its efficacy is also controversial. Recent studies on the effects of sacral nerve stimulation have claimed it is effective for patients with intractable constipation⁹⁾; however, other studies failed to find evidence to support the effectiveness of the low-frequency current therapy in the treatment of constipation patients^{10, 11)}. Therefore, the purpose of this study was to determine whether low-frequency current therapy can be used to reduce the symptoms of ISTC.

SUBJECTS AND METHODS

This study was conducted in the city of Andong, South Korea, between May and July 2013. Fifteen patients (ten male and five female) were enrolled in the present study. The inclusion criteria required the subjects to be constipated with scores on the Constipation Assessment Scale (CAS) above 4 points¹²⁾, and an abnormal bowel frequency (<3 bowel movements for a week)¹³⁾. Exclusion criteria were: dementia, psychiatric problems, cancer, or scheduled for surgery. Prior to the initiation of this study, all of the subjects were provided with a detailed description of the experimental procedures, and they signed a written and informed consent form in conformity with the ethical principles of the Helsinki Declaration. The main characteristics of the subjects are presented in Table 1. Low-frequency current was applied using transcutaneous electrical nerves stimulation through four electrodes (TENS) (Chung Woo, Seoul, South Korea). The four electrodes were each placed on the S2-S3 dermatomes of the buttocks. The current was set at a comfortable intensity, and a frequency of 50 Hz with burst intervals of three seconds and six seconds were used. Twenty minutes of electrical stimulation was given in each session, and electrical stimulation therapy was performed three times a week for six weeks. In this study, data were analyzed using SPSS 12.0 (SPSS Inc., Chicago, IL, USA). All data values are presented as means and standard deviations. The comparison before and after treatment was performed using the paired t-test. Values of $p < 0.05$ were considered to be statistically significant.

RESULTS

After the intervention the bowel movements per day

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Table 1. Characteristics of participants

Sex	Age (years)	Weight (kg)	Exercise time (min/day)	Water amount (ml/day)	Meal frequency (times)	Diet experience	Laxative experience
Male: 5 Female: 10	21.60±2.53	56.20±9.79	26.33±22.72	570.84±258.31	Two: 10 Three: 5	Yes: 8 No: 7	Yes: 4 No: 11

Table 2. Comparison of constipation symptoms between pre- and post-test

Variable	pre test (0 weeks)	post test (6 weeks)
Bowl movements per day*	0.47±0.52 ^a	1.07±0.26
Bowl movements per week*	2.47±0.64	5.27±1.44
CAS score*	1.02±0.42	0.20±0.09

*p<0.05, ^aMean±SD, CAS: constipation assessment scale

and week, and the CST points were significantly improved compared to their respective values before the experiment (Table 2).

DISCUSSION

This study was conducted to investigate whether the use of low-frequency current applied to the sacral dermatomes is helpful for ISTC. The findings of this study support the suggestion that low-frequency current therapy may be favorably used to diminish symptoms ISTC. Electrical nerve stimulation of the sacral dermatomes has been demonstrated to increase the bowel activity of the recto-sigmoid colon, which is evidenced by the activation of the pelvic parasympathetic nerve originating from the sacral spinal cord¹⁴. Based on this, Lee et al.¹⁵ suggested that magnetic stimulation over the S2-S3 dermatomes of the buttocks would contribute to amelioration of ISTC. Frost et al.¹⁴ also reported an increase in rectal contractile activities after electrical stimulation of the S2 dermatome. These studies were similar to our present study. The results of our present study suggest that low-frequency current stimulation of the S2-S3 dermatome increases both defecation and CAS scores, and they show that stimulation with low-frequency current of the sacral dermatomes may offer therapeutic benefits for a subset of patients with ISTC. However, this study had several limitations that should be addressed by further studies. A pre-post study is highly limited with regard to the inferences that can be drawn from it because of the nature

of the design. Further studies with randomized control trials are required, and the efficacy of the treatment needs to be established in a larger sample size.

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